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IDAHO DEPARTMENT OF HEALTH & WELFARE

Bureau of Community and Environmental Health

Nitrate and Groundwater Fact Sheet

What is nitrate and how is it used?

Nitrate is a form of nitrogen found in the environment and comes from various sources. When plants and other organic matter decompose, nitrogen is converted to inorganic forms, mostly nitrate. Another environmental source of nitrate is discharge from septic or sewer systems. Nitrate also gets into the soil from animal feedlot wastes and nitrogen-based fertilizer application. These include animal manures, human wastes, composts, and sewage sludge, as well as manufactured fertilizers made of nitrogen and ammonium. Ammonium not utilized by plants can be converted to nitrate.

What happens to nitrate when it gets into the environment?

Plants use nitrate for growth. They also return nitrate to the soil when they decompose. Nitrate that is not used by plants can build up in and move through soil. Precipitation, irrigation, and sandy soils make it easier for nitrate to move around and get into surface water and ground water.

Why is nitrate in groundwater a concern?

Groundwater supplies 95% of the water used in Idaho households. Groundwater also supplies drinking water to 204 cities and towns. High levels of nitrate in drinking water are associated with adverse health effects.

How is nitrate in groundwater regulated?

The U.S. Environmental Protection Agency has established a federal drinking water standard, called a Maximum Contaminant Level (MCL) of 10 milligrams per liter (mg/L), or 10 parts per million (ppm) for nitrate. The Idaho groundwater quality standard is also 10 mg/L. Public water systems are required to sample for various contaminants, including nitrate, on a regular basis. There is no required sampling of domestic or stock wells. However, it is recommended that owners test their wells for nitrate on a regular basis.

How can nitrate affect my health or my child's health?

People may be exposed to nitrate in both food and water. In healthy adults and older children, ingested nitrate is absorbed from the digestive tract and excreted rapidly in the urine. Exposure to fairly large amounts of nitrate is not usually associated with short-term adverse effects. Infants younger than 6 months, however, are sensitive to nitrate poisoning, which may result in serious illness or death. The illness occurs when nitrate is converted to nitrite in a child's body. Nitrite reduces oxygen in the child's blood, causing shortness of breath and blueness of the skin, hence the name "blue baby syndrome." The name of this condition is methemoglobinemia. This illness can be a serious condition in which the child's health deteriorates rapidly over a period of days.

Other health effects may occur with long-term high exposure to nitrate. These include problems with reproduction and development, as well as cancer. At this time there is no hard evidence that nitrate can cause these harmful health effects, but research is ongoing.

How do I find out if my well is contaminated with nitrate?

Nitrate is tasteless, odorless, and colorless. To find out if there is nitrate in your domestic or stock well water, have it tested by a laboratory that is certified for nitrate testing by the Idaho Division of Health. Laboratories will provide sampling bottles and instructions. Contact your local health department, or look in the Yellow Pages under "Laboratories - Testing" or "Water Analysis" for a certified laboratory serving your area. It's a good idea to have a routine nitrate test at least annually. You should also have your water tested for nitrate if you are a woman planning on becoming pregnant or if

infants will be using the water. If you are connected to a public water system refer to that system's Consumer Confidence Report for the nitrate level in your drinking water.

What if nitrate is found in my water?

If the nitrate concentration exceeds the MCL of 10 mg/L, do not give the water to any infant under six months of age, either directly or in formula. Infants should be provided with water from a source which has been tested and shown to be low in nitrate. Commercially bottled water is required to meet the nitrate standard, and can be given to infants. Do not boil to "treat" high nitrate water. Although it is common to think of boiling, softening, or filtration as a means of purifying water, none of these methods reduce nitrate contamination. Boiling actually concentrates the nitrate due to evaporation of the water. Home water treatment units are not recommended for treating high nitrate water which will be given to infants. There is no foolproof way of knowing when the treatment system may fail, and blue baby syndrome has been known to occur after just one day of exposure to high nitrate water.

It's a good idea to have the well inspected by a licensed well contractor if the well is old, or you do not know if it is structurally sound. Nitrate problems are sometimes caused by structural flaws which allow contaminated surface water to enter the well. Repairing the well or constructing a new, deeper well often results in a significant reduction in the nitrate level. To find licensed well drillers in your area, look in the Yellow Pages under "Well Drilling & Service" or "Water Supply Systems."

Identify and remove sources of nitrate near the well. Fertilizers, animal wastes, and sewage systems should be located and managed so that they do not contaminate the well. If a nitrate source is too close to the well and cannot be moved, then you may need to hire a licensed well contractor to permanently seal and replace your well.

Nitrate and livestock health

Nitrate poisoning is most likely to occur in livestock animals such as cattle and sheep. Generally, high-nitrate water is only a concern when used with high-nitrate feeds. Water levels of 20 to 40 mg/L are considered safe for livestock unless feed is high in nitrate. Levels of 40 to 100 mg/L are not recommended for young livestock, and are only safe for mature livestock if feed is very low in nitrate. Levels of nitrate-nitrogen over 100 mg/L should not be used.

Ecological effects of nitrate

Nitrate can enter surface water through surface runoff, or through recharge from ground water. Excess nitrogen in surface water, in combination with other plant nutrients such as phosphorous, can lead to excessive growth of algae and other aquatic plants; this can lead to decreased oxygen levels and harmful effects on aquatic life.

For additional information contact:

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